On Business Intelligence SaaS solution

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Abstract: Cloud computing, which is a popular and still more adopted concept even in enterprise computing, brings by its SaaS service (Software as a Service) on public cloud a new possibilities of augmenting/expanding the functionality of on-premises ERP systems. This paper presents a case study oriented towards use of SaaS BI (Business Intelligence) solution for on-premises ERP system augmentation, with main aim to determine particular SaaS adoption drivers, SaaS concerns as well as business benefits of this approach.

Keywords: ERP (Enterprise Resource Planning), cloud computing, SaaS (Software as a Service), BI (Business Intelligence)

1. Introduction

Modern IT based Business information system (BIS), oriented towards information needed for achieving the objectives of a business [1], is typically based on an ERP (Enterprise Resource Planning) system. An ERP may be defined [9] as a packaged business software system that enables a company to manage the efficient and effective use of resources (materials, human resources, finance, etc.) by providing an integrated solution for the organization's information processing needs. Integration of all company data and processes into an integrated system is often cited as ERP basic feature.

1.1 Cloud computing

Cloud computing, namely SaaS on public cloud, has significantly influenced the on-premises ERP systems architecture, viewed from the perspective of individual sub-systems provisioning. This architecture is based on integrated core on-premises ERP system, delivered typically by single vendor, which is augmented by one or more application sub-systems delivered as off-premise SaaS. Our paper is oriented towards simple case, in which the ERP on-premises core has been augmented by single SaaS sub-system/solution (i.e. BI) provided on public cloud. BI SaaS solution adopted is therefore described in section 2 and its adoption by the user is described in section 3 below.

Cloud computing as defined by NIST (US National Institute of Standards and Technology (NIST) [7] is composed of five characteristics, four deployment models and three service models. In the context of our paper we are interested in SaaS service model deployed over public cloud. SaaS service model refers to the model of software deployment where application (software) is provisioned as a service over the Internet. Application is (typically) owned, managed, operated by (third party) service provider.
Number of SaaS benefits (adoption drivers) as well as number of challenges/concerns (adoption barriers) is cited in many references (including [2]).

Benefits include: quick deployment (app is ready to use); App infrastructure (hardware, software) provided and managed by vendor; App management and upgrades provided (automatically) by vendor (including data backup) – and included in user fee; high, quick and simple solution scalability, e.g. expansion of user base; solution flexibility, i.e. easy customization (without assistance of IT specialist); no upfront costs; (relatively) low operating costs; access to app only by browser (from anywhere)

Challenges include: security (data and processes); service performance and availability meeting SLA; integration with existing applications; customization to unique business requirements; availability of enterprise level vendor’s support and maintenance; high dependence on external provider; high costs of SaaS model; data lock-in and location concerns; SLA quality and possible modification, IT management, governance..

Although these concerns are still valid, [4] argues that initial concerns about security, response time and service availability have diminished for many organizations as SaaS business and computing models have matured and adoption has become more widespread.

1.2 Business intelligence

Business intelligence (BI) is defined as the tools, technologies, and processes required turning data into information and information into knowledge and plans that optimize business actions [3].

More broadly BI may be seen [13] as business information and business analyze within the context of key business processes that lead to decisions and actions and that result in improved business performance.

Plethora of BI technologies may be used for various BI disciplines. [3] defines the following disciplines and corresponding technologies:

- reporting – query, reporting & search tools
- analysis – OLAP (On Line Analytical Processing), visualization tools
- monitoring – dashboards, scorecards
- prediction – predictive analytics

BI software, denoted often as „BI platform“, may include several or all of the following functionalities: standard analytics and reporting, advanced analytics and reporting, dashboarding, metrics and KPI (Key Performance Indicators) analytics, predictive analytics, OLAP services, data mining, warehousing. Top on-premise solutions typically provide more advanced functionalities in comparison with SaaS BI solutions.

BI functionality, namely dashboarding used for scorecarding, is also typically part of CPM (Corporate Performance Management) suite, which includes integrated software applications supporting number of corporate management processes including budgeting, planning and forecasting, profitability modeling and optimization, scorecarding, financial and regulatory reporting and financial consolidation.

BI use in enterprises is evolving in two basic directions, while both directions are positively influenced by SaaS BI
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- to pervasive BI (PBI). PBI [8] empowers everyone in the organization, at all levels, with analytics, alerts and feedback mechanisms. Pervasive business intelligence is BI for the rest of organization. It's the ability to take relevant information that is usually reported up to management and push it down to users
- to agile BI, which is defined by [11] as BI that can rapidly and cost effectively adapt to meet changing business needs. Access to management information in the timeframe that business managers require is an important metric. Dashboards are mentioned as convenient tool for this purpose

Adoption of SaaS BI is driven mainly by the following factors, presented in [11], which is a survey of 400 BI users, as well as in [6], [10]:

- conventional BI tools are too complex and hard to use for business users – in this context the report notes "clear indication that the relative simplicity of SaaS BI tools presented via a browser is a strong driver of (SaaS BI) adoption"
- tight budgets – in this context the report notes "several economic advantages of SaaS BI over on-premise solutions including more flexible pay-as-you-go licenses and subscriptions, faster time to value, eliminating the expense of hardware investments and availability of pre-packaged KPIs and metrics that can significantly help in cutting the time and cost involved [10]"
- long, resource intensive deployments of conventional approaches. As seen above the relative simplicity and faster time to value are significant SaaS BI features supporting its adoption

SaaS BI also, as report notes, encourages agile and flexible BI solutions. “A number of capabilities that contribute to agility are related to self-service BI...which is fostered by SaaS BI in many ways, as it provides increased ability for business users to find the info they need without IT department assistance. Companies using SaaS BI had 50% more employees involved in the BI process than those using non-SaaS BI [10]”, which fact may be seen as a result of SaaS aid of pervasive BI.

2. BI SaaS solution

BI SaaS solution deployed by the user (see section 3), denoted as Gooddata BI Platform [5] – which is Gooddata (GD) the only product, is provided by Internet start-up Gooddata Inc, which was founded in 2007. It was founded in the Czech Republic, currently with the main office in San Francisco CA i.e. “Czech born, Valley centric”. This situation indicates the main orientation towards US market, not excluding also European market – mainly the Czech Republic. Most of its staff, including most of R&D, is located in the Czech Republic. There are number of users with large implementations, in some cases with several thousands seats, e.g. Software A.G. Third parties’ (GD partners) applications, including GD BI platform, are used by several thousands of end-users.

The GD SaaS BI is complete platform, which takes care of data integration as well as of BI functionality. At the time of implementation by the user the functionality included analytics and reporting, dashboarding, metrics and KPI (Key Performance Indicators) analytics, with technological platform based on Amazon web services including EC2, EBS, and S3. GD BI Platform was introduced in beta version in 2008, in production
version in 2009. It is continuously developed and upgraded, with new software version in every 2 weeks,

Pricing is based on a monthly subscription model, which is based on one of 3 levels (tiers) – with the price based on the number of data marts, the data volume, the number of end-users (seats). For each selected level the user may specify several other aspect of solution (including e.g. GD assistance); the user’s price is then determined accordingly.

2.1 SaaS implementation

There are two ways of the user application implementation - mainly by the user (perhaps with the GD assistance, i.e. Managed Service), or by the GD Professional Services. The user may also use one of the many ready-to-use applications, e.g. GD for Salesforce, which may be later upgraded to more functionality. A number of these applications have been developed by third parties (GD partners), by integration of the GD BI platform into their SaaS application e.g. the GreatVines Advanced Analytics, which is marketed by this third party. The GD strongly supports third party developers among others by publishing the REST platform API.

2.2 Data integration

Data Integration refers to the tools and processes that are used to move and transform data between source systems (i.e. ERP on-premises applications) and target system (i.e. GD cloud resource). By ETL (Extract, Load, and Transform) processes, supported by ETL software, data are extracted from production applications, transformed when needed and loaded as consolidated data into on-premises data mart. From data mart data is transferred into GD cloud/virtual resources, where it is located for processing. Migration of on-premises data into a cloud and cloud data synchronization with on-premises data mart data is viewed as critical success factor of SaaS BI implementation.

2.3 GD BI platform benefits for users

Based on users reactions, GD indicates the following GD specific, i.e. over the general benefits of SaaS BI, user benefits

- friendliness and relative simplicity of environment – reports/dashboards may be created also by business end-users. In case the data sources required for report are located on cloud, new report may be created in several minutes. With every change of data report is recalculated automatically.
- ability of quick reaction on new requirements (especially on changes of report model)
- high level of GD support
- high performance/cost ratio
- availability of several SaaS third party applications to potential customers free of charge for limited period of time (typically 1 month). Based on the experience potential customer may decide to purchase the application, eventually with reports upgrade.
3. BI SaaS adoption by the user

The Czech IT organization oriented towards Internet service provisioning (ISP) is the GD SaaS BI user. The ISP is oriented to local Czech market only. Its 800 employees include also 250 IT staff, albeit with no special BI qualification.

The ISP is using ERP delivered by local Czech vendor for over 5 years as well as several self-developed applications. However, unified data for the whole organization, located on the single place was missing, as well as a tool for its analysis and unified organization-wide reporting. This situation resulted in the need for BI platform capable to fulfill these requirements, which was presented by finance/economic manager.

3.1 Selection process

The selection process of a BI vendor, started with several selection criteria, TCO (for 3 years of use) and quick deployment being the most important ones. The GD BI platform, being the only one cloud-based solution (i.e. SaaS), was selected by the ISP as the best solution. Low implementation costs, possibility of using data mart created by GD, in case of the ISP dissatisfaction with GD solution, for another cloud SaaS provider as well as mutual trust of both organizations based also on good relationships of their managements were also in favor of GD solution. The ISP main selection criteria correspond to the 3 main SaaS adoption drivers (A1 – A3) presented below together with user satisfaction after solution implementation (as evaluated after over a year long operation).

However, the SaaS solution adoption presented also several challenges for the ISP. Three main ones (C1 – C3) are presented below together with user satisfaction after solution implementation.

3.2 Implementation

The GD SaaS implementation started in August 2010. Within implementation process the data mart data model was created, data mart itself was loaded by consolidated data from various on-premises applications, data was uploaded into GD cloud resources (see also below). Implementation project was managed by deputy finance manageress with implementation team including on part-time basis mainly the ISP analysts, application managers as well as GD consultant, who helped mainly with data model and development of the first reports. On-premises data mart was developed and populated within about one month. Based on GD cloud data three BI applications with several reports each were implemented and introduced into production operation. GD uses an agile method of implementation. It is based on relatively fast development of first version of data mart as well as of application and corresponding reports, which are then available to selected business users for testing, results of which impact the next application version. Application is finally released into production operation. Using this approach, the first project – integrating 6 different data sources with dashboard including 80 reports, was available for production operation in 12 weeks after implementation kick-off. Final 3 projects, including roughly 400 reports, were in production in 4 months since implementation beginning. 5 seats were used during implementation period. 30 seats have been used in production operation since then, resulting in the ISP monthly license fee of about 1900 USD, collected on monthly basis. Because of good command of English of members of implementation team as...
well as of the ISP management, English version of SaaS has been used, with some terminology adjusted to organization standards.

GD BI SaaS implementation was provided mainly by GD Professional services local consultants with cooperation of the ISP IT personal. GD consultants spent 60 man-days on implementation and 10 man-days on training of one IT employee as application administrator (for user administration, adding reports, adding data sources, communication with GD) and of 2 IT employees for actualization of data mart’s data, adding new data sources, and data upload from on-premises data mart to GD cloud resources.

3.3 Data integration, backup

In the course of implementation, on the basis of data model developed by consultants, data mart was created and populated by production data from ERP subsystems by GD consultants in cooperation with IS IT staff. ETL tool provided by GD was used. Consultants then provided data migration (upload) of 7 GByte data mart to SaaS cloud resources. In production operation on-premises data mart is actualized automatically by data from the internal ISP applications on weekly basis, by data from accounting application (partly manually) on monthly basis i.e after monthly financial statement. Cloud data are synchronized with data mart on weekly basis. Cloud data back-up is provided automatically by GD at cloud resources. Having the last version of data (albeit without visualization tool) in on-premises data mart, the ISP does not provide its own on-premises data backup.

Service availability is evaluated by the ISP as satisfactory (see BC3 below). Several outages for about 2 hours during office hours were caused by regular application upgrade, which is exercised according to US time. These outages did not have a significant economic or managerial impact. Only in two cases, the outages were unpleasant – once when the required information was not immediately available for interview of top management with the press and once when medium-level managers have to wait for monthly financial statement. Once the collapse in Amazon data center caused outage for 2 days.

3.4 User expectations fulfillment

Across the whole ISP organization there is generally a great satisfaction with the GD SaaS implementation. It has fulfilled all expectations and brought number of new inventions, which are implemented gradually. Management decisions are now based on unitary data and unitary reports which support quick, data driven and efficient management decisions. Use of GD BI reports have become the standard and top management may even use the GD BI interesting feature of providing the possibility to follow how many times within last few weeks were individual reports accessed by individual users. There has been also a great satisfaction with GD Professional service consultants’ activities, which are regarded to be a critical success factor of the whole project.

For achieving higher users’ satisfaction the availability of end-user-friendly tools for incorporating of new data sources into model (setting up of model actualization and management) as well as greater and “nicer” possibilities of data visualization would be
Three main business benefits of the solution (B1 – B3), together with user satisfaction after solution implementation, are presented below.

The ISP, supported by top management, is preparing further development of GD SaaS BI solution on its way of providing “data driven management culture” in the ISP organization. Further extension of data model by new data sources and corresponding support by BI functionality should support a more complex view of the whole organization and assist in its efficient management. Particularly the broader exploitation in commerce opportunities management, including client segmentation in combination with predictive analytics is planned.

User also indicated SaaS adoption drivers, adoption concerns and business benefits; top ones are presented below, including order of importance, importance level, and user satisfaction as indicated by the user. Satisfaction is evaluated by user at about six months after solution implementation.

Top SaaS adoption drivers:
- A1/ Low initial costs (operational costs, no capital costs e.g. for servers purchase) – A, 5, 5
- A2/ (relatively) low operating costs as well as low TCO (Total Cost of Ownership) (i.e. long term cost savings) – B, 5, 5
- A3/ Quick deployment (application is ready to use) – C, 5, 4
- The order of importance given by the user is marked by letters A, B etc. For every driver also its importance level and user satisfaction, evaluated at more than one year after solution implementation, is indicated on scale 1 to 5 (5 is the best).
- Note: the labeling of the adoption drivers, the adoption concerns and the business benefits, as for example A1 above, is used for short referencing in paper.

Importance level:
- very insignificant - 1
- insignificant - 2
- neutral - 3
- significant - 4
- very significant - 5

Satisfaction:
- very dissatisfied - 1
- dissatisfied - 2
- neutral - 3
- satisfied - 4
- very satisfied – 5

Top concerns of SaaS adoption:
- C1/ security (data and processes) – A,5,5
- C2/ data location concerns – B, 5, 5
- C3/ ensuring system performance meets or exceeds SLA (performance, availability etc.) – C, 5, 4
- The order of importance given by the user is marked by letters A, B etc. For every concern also its importance level and user satisfaction, evaluated at more than one year after solution implementation, is indicated on scale 1 to 5 (5 is the best).

**Top business benefits in user company as a result of adopted SaaS solution:**
- B1/ internal collaboration improvement – A, 5, 4
- B2/ cost savings – B, 5, 5
- B3/ facilitation of business processes improvement - C, 4, 4
- The order of importance given by the user is marked by letters A, B etc. For every benefit also its importance level and user satisfaction, evaluated at more than one year after solution implementation, is indicated on scale 1 to 5 (5 is the best).

**4. Conclusions**

Following three factors for a successful implementation are regarded as important/critical:

- requirements for missing business functionality, i.e. for unitary business data and unitary reporting were originated by the organization's business management and received support of the top management. SaaS solution was used as a tool for achievement of these business requirements afterwards. Originating the need at the business side and providing the IT solution afterwards may be seen as fine example of “business IT alignment”, which is not always the case, especially when the solution (implementation) is proposed by the IT side, sometimes not receiving full support of the business side

- consultant team, i.e. GD Professional Services consultants, which implemented the lion share, was professionally of high level and, as stated by users, proved to be a critical success factor of the successful implementation

- high level of mutual trust was an important factor. The trust was based on the top management's good relationships and perfect information on GD abilities and resources.

From data integration point of view, which is often cited as an important success factor, the following aspects were considered by the users as well as by the SaaS providers as fundamental

- during implementation – data model creation and initial on-premises data migration to cloud
- during production operation – actualization/synchronization of cloud data with on-premises data.

Although simple means were used for satisfying (not very demanding) integration requirements, user satisfaction was accomplished in both case studies.

The global success of the implementation, from the user point of view, is expressed by the user satisfaction at “very satisfied” (in most cases) or “satisfied” level in all three views. The user satisfaction after a reasonable time of service use (over 6 months) is
regarded as an important factor. Some SaaS related factors (e.g. SLA agreements) may be regarded as missing, because of their lower importance for the particular user. However the implementation may be regarded as an evidence of continuous elimination of a number of SaaS concerns (at least in simple implementations) by improvement of the SaaS solutions and their increasingly customer-centric orientation. The case described thus provide practical evidence of successful SaaS implementations and use.

This paper is a part of our research in Enterprise architecture, as the cloud computing and SaaS significantly influence this research area, namely the application architecture which is also part of most Enterprise architecture frameworks.

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References


**JEL:** M10, C88